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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

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REPLY TO THE ATTENTION OF:

MEMORANDUM

5SMQA

DATE: MAY 18 1989

SUBJECT: Review of Revision 1 Quality Assurance Project Plan (QAPjP) of the PRP-Lead Remedial Investigation/Feasibility Study at the American Chemical Services(Griffith, IN) Site

Melvin C. Long

FROM: James Adams Jr, Chief
for Quality Assurance Section

QUALITY ASSURANCE BRANCH

TO: ~~Don Bruce, Chief~~ James Mayka, Chief
Illinois/Indiana Section

MAY 31 1989

ATTENTION: Robert Swale, RPM

ENVIRONMENT SERVICES DIVISION

The Quality Assurance Section has completed its review of the subject revised QAPjP(QAS Log-In # 929) received on May 9, 1989. The revision was reviewed against initial draft comments dated November 3, 1988 and discussion from the April 18, 1989 QAPjP meeting.

The current revision is not approvable until the remaining comments listed below are addressed. In addition, the QAS has prepared several modified pages which shall be included in the QAPjP. To expedite the review, include only the pages which need to be changed in the next submission.

1. COMMENTS OF 11-3-88.
The following comments(indicated by comment number) remain to be addressed:

3.0 f).
1 The revised QAPjP section 3.5 Sample Network and Rationale(Page 11 of 38) still does not include a Figure to define approximate boundaries of the site areas(Off-Site Containment Area, Old Still Bottoms Pond etc). Work Plan Figure 2-1 notes the areas but does not give approximate boundaries. Include a Figure and state that these boundaries will be further defined in Subtask 1 B(Survey Site Boundaries). In addition, the Figure should include the approximate grid systems of the Geophysical Survey(Subtask 1 C) for the applicable areas of that survey.

9.1.2 a).
2 This section(Page 21 of 38) still conflicts with section 9.2.1. This section should clearly state that the CLP SOW 7/87 will be used for all TAL inorganic analyses except residential well water analyses

which will use Warzyn's SOPs included in Appendix F.

11.0 c).

3 ? The revised discussion of data deliverables for water quality indicator parameters notes that "The reporting format to be used is unspecified." Specify the format and include examples of reporting forms which will be used by Warzyn.

12.0 c)

4 Specify the party at Warzyn(i.e. QA Manager) who will conduct internal field and laboratory audits. Indicate to whom(including USEPA RPM) and how internal audit results/reports(i.e. project technical memoranda QA section: see QAPjP section 16.0) are reported.

APPENDIX B: Sampling Plan.

5 o 5.5 Surficial Soil Sampling
  5.7 Test Pits
  5.8 Soil and Waste Borings

1-26-2) check w original Stuart

The details of the criteria used to field select soil samples for lab analysis shall be included. The statement "...on the basis of HNu results and/or other evidence..." still remains vague.

6 o 8.0 Sample Documentation.
  Sampling locations need to be described in field logbooks relative to surveyor's coordinates. Photos are an excellent resource however they should be supplementary only.

7 o Sample bottle decontamination
  No description or SOP of sample bottle decontamination and the audits performed to ensure that bottles are free of contaminants are included. Who will provide decontaminated bottles(i.e. field contractor, laboratories)?

4 at 5.1 abort ? volatile for soil samples

APPENDIX C: Analyte Lists.

8 o Include CLP RAS TAL CRDLs for inorganic soil matrices.
o Low level drinking water organic detection limits from Hazleton Laboratories are not included in this Appendix. Appendix E includes the volatile and pesticide/PCB detection limits but is missing the semivolatile DLs.

The table is method validation study, does not show MDL.

2. QAS MODIFIED PAGES.

The QAS has prepared the page modifications listed below in order to expedite the QAPjP process. Copies are attached to this review and shall be included in all copies of the next revision.

9 3.4 Project Objectives. Page 10 of 38.
The last paragraph of the section was modified to reference Table 7 which includes the project's Data Quality Objectives(DQOs).

10 4.4 Specialized Responsibility for Laboratory Analyses. Pages 18/19 of 38. These pages were modified to delete references to the "Contract Project Management Section(CPMS)".

5.1.1 Field Sampling Program. Page 20 of 38.
11 This section was modified to change TCL inorganics to TAL inorganics. The last sentence was also clarified to include the underlined: "...deionized water passed through decontaminated sampling equipment followed by passing through a decontaminated filtering apparatus."

7.0 Sample Custody and Documentation.
12 Field. Page 27 of 38.
The reference to Appendix I was corrected to K.

11.0 Data Reduction, Validation and Reporting. Page 32 of 38.
13 The 4th paragraph was modified to include the most current revision (July 1988) of the Inorganic Functional Guidelines.

14 APPENDIX K: Document Control and Evidentiary File System.
The reference to "Fadrowski Drum Disposal" was deleted.

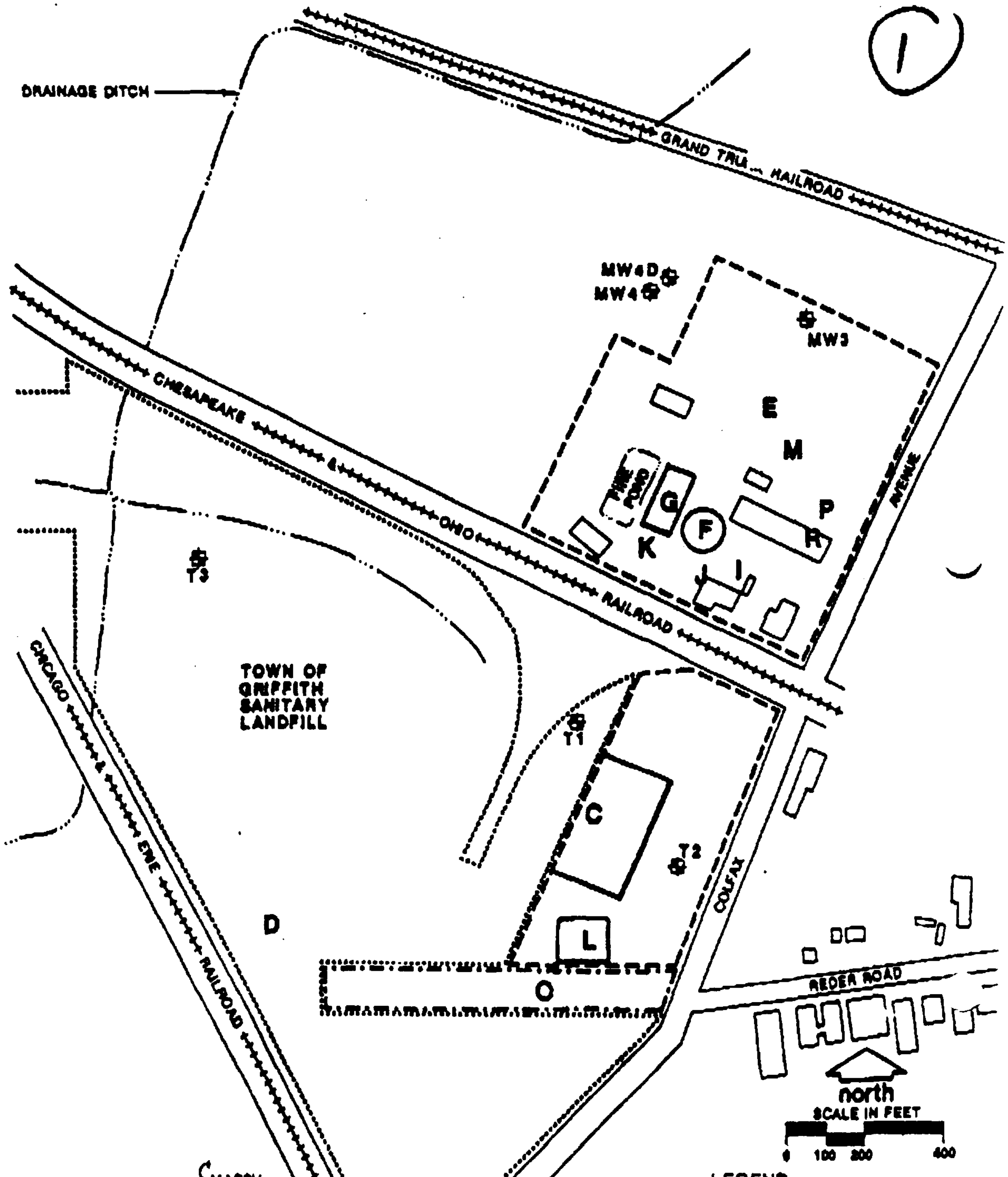
3. ANALYTICAL LABORATORIES.
It is noted that the responsibility for the CLP RAS TCL organic analyses in QAPjP section 4.3 Laboratory Analyses and QC has been ammended to include Compuchem in addition to Hazleton Laboratories. If Compuchem is presently a CLP RAS organic laboratory in good standing and will not deviate from the current CLP SOW, this may not be a problem. The USEPA Region V Central Regional Laboratory can provide information in regard to this.

15 A short, one or two line statement should be included in section 4.3 to indicate the circumstances as to why there is the need for the redundancy of laboratories.

Please contact Kevin Bolger(3-7712) of my staff should you wish to further discuss these comments.

ATTACHMENTS

cc: K. Bolger, QAS/ESD
C.W. Tsai, QAS/ESD



EPA IDENTIFIER	NAME OF AREA
C	OFF-SITE CONTAINMENT AREA
D	GRIFFITH CITY LANDFILL
E	ON-SITE CONTAINMENT AREA
F	OLD STILL BOTTOMS POND
G	TREATMENT POND #1
K I J	OLD WASTE WATER TRENCHES
L	KAPICA DRUM DRAINING AREA
M	OLD DRUM STORAGE AREA
O	KAPICA DRUM PROPERTY
P	FUME INCINERATOR
R	PREVIOUS SPILL/FIRE

FIGURE 1-A. Locations and Boundaries of Waste Areas

18-15209

REMEDIAL INVESTIGATION SITES

REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
AMERICAN CHEMICAL SERVICES SITE
GRIFFITH, INDIANA

WARZYN

AS SHOWN

LIST OF TABLES

1

LIST OF FIGURES

3.4 Project Objectives

The RI/FS will be performed to gather and assess information needed to accomplish the following objectives:

- Determining if the ACS site poses a risk to public health, welfare, or the environment.
- Determining the characteristics, extent and magnitude of contamination at the site.
- Defining the pathways of contaminant migration from the site.
- Defining on-site physical features and facilities that could affect contaminant migration, containment, or cleanup.
- Developing viable remedial action alternatives.
- Evaluating and screening remedial action alternatives.
- Recommending the cost-effective remedial action alternative which adequately protects health, welfare and the environment.

All tasks, subtasks, and activities are directed toward the accomplishment of these primary objectives.

Under the Superfund Amendments and Reauthorization Act of 1986 (SARA), it is recommended that the RI/FS are integrated so that parts of each are conducted concurrently. Therefore, the project will be conducted in several phases of investigation. Each phase will be designed to make optimal use of information as it is derived and to produce the information which is necessary to complete the FS. A summary of tasks covered by this QAPP and intended data uses is summarized in Table 4. Table 7 outlines the project's Data Quality Objectives (DQOs)

9

3.5 Sample Network and Rationale

The activities and subtasks related to the field work are listed below. For a complete itemization of all tasks, see the Work Plan (Appendix A). The project schedule is shown in Figure 3.

- Compuchem
  3308 Chappel Hill Rd/Nelson Hwy
  Research Triangle Park, North Carolina 27709

• Analysis of groundwater, soils and leachate samples for Target Compound List (TCL) organics using protocols for low detection limit analyses (see Appendix C for method description):

- Hazleton Laboratory
  3301 Kinsman Blvd.
  Madison WI 53704

• Analysis of groundwater and leachate samples for Target Analyte List (TAL) inorganics (see Appendix D for analyte list)and general water quality indicator parameters including COD, TOC, total suspended solids, total dissolved solids, nitrate + nitrite, alkalinity, chloride, sulfate and ammonia-N. Analysis of private well samples for TAL inorganics using low detection limit methods.

- Warzyn Engineering Inc.
  One Science Court
  Madison, WI 53711

• Analyses of soil samples collected during activities 2A.3, 4A.1, 4A.2 will be evaluated for Atterburg limits, grain size, permeability and moisture content, and cation exchange capacity.

- Warzyn Engineering Inc.
  One Science Court
  Madison, WI 53711

Warzyn is including a secondary contracting laboratory for the analysis of CLP RAS TCL organics to facilitate greater fexibility in scheduling and improve sample turnaround times. 15

4.4 SPECIALIZED RESPONSIBILITY FOR LABORATORY ANALYSES

• Hazleton Laboratory Data
  - Analytical protocol specified - Warzyn Engineering Inc.
  - Review of analytical protocol - Hazleton
  - Review of analytical protocol - U.S. EPA Region V Quality Assurance Section (QAS) and Central Regional Laboratory (CRL) 10
  - Internal QA/QC - Hazleton staff
  - Final data review and validation - Warzyn Engineering Inc.
  - Review of tentatively identified compounds and assessment of need for confirmation - Warzyn Engineering Inc.

- Compuchem Data
  - Analytical protocol specified - Warzyn Engineering Inc.
  - Review of analytical protocol - Compuchem
  - Review of analytical protocol - U.S. EPA Region V Quality Assurance Section (QAS) and Central Regional Laboratory (CRL)
  - Internal QA/QC - Compuchem
  - Final data review and validation - Warzyn Engineering Inc.
  - Review of tentatively identified compounds and assessment of need for confirmation - Warzyn Engineering Inc.

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- Warzyn Data
  - Review of analytical specifications - U.S. EPA Region V QAS and CRL
  - Internal QA/QC - Warzyn Engineering Inc.
  - Final Data review and validation - Warzyn Engineering Inc.

4.5 QUALITY ASSURANCE

- Overall QA Responsibility
  - Warzyn Quality Assurance Officer

- QA for Warzyn Subcontracted Activities
  - Warzyn Engineering Inc.

- Review of QAPP
  - U.S. EPA Region V QAS and CRL

- Field Analyses
  - Warzyn Engineering Inc.

4.6 PERFORMANCE AND SYSTEMS AUDITS

- Field Operations
  - QAO, Warzyn Engineering Inc.
  - U.S. EPA Oversite Contractor

- Analytical Laboratories
  - U.S. EPA Region V Central Regional Laboratory (CRL)

- Final Evidence File Audits
  - QAO, Warzyn Engineering Inc.

An organizational chart is shown in Figure 4.

5.0 QUALITY ASSURANCE OBJECTIVES

The overall quality assurance objectives are to implement field sampling, chain-of-custody, and quality control reporting procedures that will provide legally defensible data from laboratory analyses in a court of law. Field analyses, including screening of samples for VOCs with an HNu and non-intrusive geophysical measurements, are being made primarily to aid in site selection for more detailed observations and analyses. Quality control objectives for these data, as well as those collected for health and safety purposes, are to obtain reproducible data consistent with limitations imposed by measurement methods used.

Specific procedures to be used for sampling, chain-of-custody, calibration, laboratory analyses, data reporting, internal quality control, audits, preventative maintenance, and corrective actions are described in other sections of this QAPP. This section (5.0) defines goals for the QC effort (accuracy, precision, and sensitivity of analyses and completeness, representativeness, and comparability) for data from analytical laboratories and presents quality control objectives for field measurements. A summary of data collection activities and associated data quality objectives is given in Table 4.

5.1 LEVEL OF QUALITY CONTROL EFFORT

5.1.1 Field Sampling Program

The quality of data from the field sampling program for laboratory analyses will be evaluated through the collection of field duplicates, field and trip blanks. Duplicates will be used to assess the combined effects of sample collection, handling and analysis on data precision. The general level of effort for all matrices will be one field duplicate per 10 investigative samples. Where appropriate, field blanks will be collected at a frequency of one per group of 10 or fewer samples per sample matrix per day. Blank samples will serve to check for procedural contamination or ambient conditions at the site that may result in apparent contamination of samples. Field blanks for leachate and groundwater samples will consist of deionized water passed through decontaminated sampling equipment. Field blanks for groundwater samples requiring filtration (TAL inorganics and indicator parameters) will consist of deionized water passed through decontaminated sampling equipment and then passed through decontaminated filtering apparatus.

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A trip blank (consisting of two 40 ml VOA vials filled with DI water and preservative) will be included with each shipment of samples for volatile analysis. The purpose of a trip blank is to assess cross contamination in the shipment cooler of samples targeted for volatile organic analysis. Trip blanks will not be analyzed unless the field blank shows contamination. The trip blank will not be opened, but remain sealed from the time it is taken from the laboratory. A shipment is to be considered a shipping unit, i.e. a single cooler.

5.1.2 Laboratory Analysis

Hazleton

Analysis of groundwater from monitoring wells, soils and leachate samples for Target Compound List (TCL) organics (see Appendix C for analyte list) will be performed either by Hazleton or Compuchem using Contract Laboratory Program (CLP) protocols. Levels of QC effort for these analyses are described in CLP statement of work SOW-7/87 or most recent. CLP SOW 7/87 will be used for all TAL inorganic analyses (except residential wells). Additional volume of sample will be collected for matrix spike/matrix spike duplicate analyses at a frequency of one per twenty investigative samples. 2

Samples collected from private wells will be analyzed for TCL organics using methods described in Appendix E, which provide lower detection limits than CLP protocols. Larger volumes of sample media and MS/MSD samples will be collected for low-detection-limit analyses (Table 8). Residential well inorganic analyses will use Warzyn's SOPs (Appendix f). As described in the method description, these analyses will have a similar level of QC effort as CLP protocols.

Compuchem

Analysis of groundwater, soils and leachate samples for Target Compound List (TCL) organics (see Appendix C for analyte list) will be performed either by Hazleton or Compuchem using Contract Laboratory Program (CLP) protocols. Levels of QC effort for these analyses are described in CLP statement of work SOW-7/87 or most recent. Additional volume of sample will be collected for matrix spike/matrix spike duplicate analyses at a frequency of one per twenty investigative samples.

Warzyn

Analyses for Target Analyte List (TAL) inorganics and general water quality indicator parameters will be performed by Warzyn using methods specified in Appendix F. QC analyses include matrix spike, laboratory duplicate and blank analyses at frequencies summarized in Appendix F. Samples from private wells for TAL inorganics analysis will be analyzed using methods providing lower detection limits. These methods and associated levels of QC effort are also specified in Appendix F.

An example of the Sample Identification Record Form to be used is shown in Figure 8. The form is to provide the means of recording shipping and tracking information. The form will include information such as:

- Sample number
- Sample matrix
- Sample location code
- Sample round
- Chain-of-custody number
- Lab code
- Date sampled
- Date shipped
- Airbill number
- Sample label number

The documentation accompanying the samples shipped to the laboratory will be sealed in a plastic bag taped to the inside of the cooler lid. The lid of the sample cooler will be securely taped shut prior to shipment. Once in the laboratory's possession, sample custody will be the responsibility of the laboratory sample custodian.

Original field notes and field documents will be maintained by Warzyn in a final evidence file. Original deliverables for analyses performed by Hazleton and Warzyn will also be contained in this file. Format and maintenance of the Warzyn's final evidence file are given in Appendix K. 12

Laboratory - Hazleton
Internal chain-of-custody procedures for Hazleton Laboratories and Compuchem will follow those described for their respective laboratories in Appendix L.

Laboratory - Warzyn
Internal chain-of-custody procedures for Warzyn's laboratory are as follows. Samples are delivered to Warzyn's laboratory under chain-of-custody. A designated sample custodian accepts custody of the shipped samples and verifies that the chain-of-custody seals have not been broken. The sample custodian reviews the information on the sample tags/labels with that on the chain of custody records. Pertinent information as to shipment, pickup, courier, etc., is entered in the remarks section. The custodian then enters that sample tag/label data into a bound logbook which is arranged by project code and station number. The sample custodian must acknowledge receipt on the chain-of-custody form. Any comments pertaining to the shipment should be made under "Remarks".

11.0 DATA REDUCTION, VALIDATION AND REPORTING

Hazleton or Compuchem - TCL Organics by CLP Reporting
Specific procedures for the identification, quantification and reporting of sample parameters for EPA TCL organics are covered in the CLP Statement of Work SOW-7/87, or most recent. Validation of data will be performed by Warzyn using Technical Directive Document No. HQ-8410-01, Laboratory Data Validation, Functional Guidelines for Evaluating Organics Analyses, February 1988.

Hazleton - TCL Organics by Specified Protocols (Appendix E)
Specific procedures for identification and quantification are presented with the method description in Appendix E. Results will be reported using the reportables format described in CLP SOW-7/87, or most recent. Data validation will be performed by Warzyn using guidelines in Technical Directive Document No. HQ-8410-01.

Warzyn - Metals, Indicator Parameter and Physical Analyses
Procedures to be used in translating instrument output to concentrations of a target analyte are documented with methods descriptions in Appendix D. Data transfer procedures within the laboratory through release of the data to the user is described in Appendix L.

Data deliverables for metals will follow CLP format as described in Statement of Work SOW 7/87. Data validation will be performed by Warzyn using guidelines provided in Laboratory Data Validation, Functional Guidelines for Evaluating Inorganics Analyses, July 1988. 13

Deliverables for general water quality indicator parameters will include raw data, results of calibration standards, duplicates, blanks matrix spikes and performance evaluation samples. A tabular format will be used for data reporting. Tables will list all samples collected and reported concentrations of all detected elements and/or compounds. In addition, each table will include a column to list QA data qualifiers for each analysis. Data will be validated by Warzyn using performance criteria tabulated in Appendix F for each analyses. If performance criteria are met, data will be considered of acceptable quality. If performance criteria are not met, data will be considered estimated or unusable. 13

12.0 PERFORMANCE AND SYSTEM AUDITS

<u>External Audits</u>
The Region V CRL will audit performing laboratories as a basis for approval or disapproval of the laboratory for requested analyses. Performance audits are to be made as specified in the appropriate CLP SOW for analyses by CLP protocols. External performance audits for non-CLP analyses are implemented through analysis of EPA quality control reference standards, which are used in the evaluation of data quality.

External audits of field activities may be performed by the EPA Region V RPM and/or an oversight contractor.

<u>Internal Audits</u>
Internal audits of field and laboratory activities are the responsibility of the Warzyn QA Manager. For subcontracted laboratories, audits will be accomplished through the use of blind samples. For laboratories used on a regular basis, these samples will provide a long-term indication of data quality. Internal audits of Warzyn's analytical laboratory will be performed using procedures described in the audit SOP located in Appendix L. The purpose of the internal laboratory audit is to evaluate and document adherence to analytical procedures described in the QAPP. Internal audit reports of the laboratory will be kept on file at the Warzyn Laboratory. Copies will be sent to U.S. EPA RPM upon request.

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Internal field audits will be accomplished thorough unannounced site visits. The purpose of the field audit will be to evaluate and document adherence to procedures described in the QAPP. The audit will include field activities, sample tags and chain-of-custody forms, field notebooks and sampling and decontamination methodologies. A description of the audit to be performed is included in Appendix L. Copies of the audit reports will be maintained on file by the Warzyn QA Manager. Copies will be sent to U.S. EPA RPM upon request.

A summary of results of audits will be included in scheduled progress reports.

5.0 SAMPLING EQUIPMENT AND PROCEDURES

5.1 GROUNDWATER SAMPLING

Sample bottle decontamination. Precleaned sample containers of the highest quality available will be supplied by I-Chem Research of Hayward, California or Eagle Picher Environmental Services, Chicago, Illinois. These will be used for volatile organic analyses of all groundwater samples 7

5.1.1 Monitoring Wells

Groundwater sampling will proceed from wells thought to have the lowest contaminant concentrations to wells suspected to have the highest contaminant concentrations. A clean work area will be set up at the well before sampling begins at that well. Prior to purging the well, a water level measurement will be made using an electronic water level indicator or a tape with a sounding device. Total depth of the well will also be measured. The reference point for these measurements is the top of the inner well casing (when protective casing present). Measurements will be made to the nearest 0.01 foot and recorded in the field notebook along with the purge volume.

Each well will be purged immediately prior to sampling, using a submersible bladder pump. The pump will be constructed of stainless steel and teflon. Dedicated teflon tubing will be used to purge and sample each well. The volume of water removed shall be measured using a calibrated bucket to ensure that a minimum of three well volumes are removed. The pH, specific conductance and temperature will be measured to determine that these parameters have stabilized prior to sample collection. The conductivity meter will be zeroed according to the procedures specified by the manufacturer prior to measurement. Buffer solutions will be used to calibrate the pH meter and conductivity meter at the beginning of each day and after every ten samples. A sample of water will be placed into a beaker into which the probes are inserted. After the readings are made, the water sample is then added to the collected purge water. Purge water will be collected and containerized.

After well purging is completed, the discharge of the pump will be reduced to 100 ml/min or less to fill the sample containers. Sample containers shall be filled in the following order: volatiles, semi-volatile, PCB/pesticides, total organic carbon, metals, cyanide, sulfate-chloride-alkalinity, ammonia-nitrate-nitrite, and total suspended solids-total dissolved solids.

5.5 SURFICIAL SOIL SAMPLING

A hand-auger or shovel will be used to remove the upper six inches of material. The bucket auger will then be inserted into the hole and the sample brought to surface and placed into a stainless steel pan. This is repeated to obtain sample from the 6 to 18 inch depth interval.

Grab samples will be placed into the sample containers with a stainless steel scoop. Composite samples (except volatiles) will be obtained by homogenizing the subsamples in the stainless steel pan with a scoop or trowel. A sample will then be placed into the appropriate sample containers. Samples for volatile organic parameters will be grab samples selected from the five discrete samples from each sampling area on the basis of HNu results and/or other evidence of contamination. If samples give HNu readings, selection will be based on highest HNu reading. Otherwise samples which appear most contaminated will be selected. One duplicate sample will be collected. No blanks will be prepared. Equipment and tools will be decontaminated as outlined in Section 6. 5

5.6 GEOPHYSICAL SURVEY

A feasibility test will be conducted to determine if the magnetometer will provide meaningful data. The instrument will be calibrated according to the manufacturer's instructions. Anomalous areas will be marked by pin flags in the field. Selected points will be duplicated to examine equipment response. If response is inconsistent, data will be considered unusable.

5.7 TEST PITS

Waste test pits will be excavated with a backhoe. The backhoe operator will remain in the cab during all excavation activities and be prepared to fill the pit quickly in the event of an emergency. Excavated materials will be placed on the downwind end of the pit for inspection. All pits will be filled prior to starting a new excavation and at the end of each work day. No pit will be left open and unattended at any time. Personnel will not enter test pits. Pits will be marked to enable future location. Samples will be taken from representative layers of waste and then composited (except volatiles). The excavation will extend at least one foot into natural subsoils. A sample of the natural subsoil will be obtained. Hand tools will be used to collect samples. Composite samples will be prepared in the field. Samples for volatile organics will be grab samples selected from one of the five discrete samples on the basis of HNu results and/or other evidence of

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contamination. If samples give HNu readings, selection will be based on highest HNu reading. Otherwise samples which appear most contaminated will be selected. The material excavated will be used as backfill for the test pit. Samples will be placed into the appropriate containers. No blanks will be prepared. One natural soil and one waste duplicate sample will be collected.

5.8 SOIL AND WASTE BORINGS

Waste borings will be continuously sampled with a split-spoon (ASTM D1586-84) to a depth of approximately 1 1/2 feet below the waste. Waste samples will be homogenized in a stainless steel pan with hand tools and a representative sample placed into the appropriate containers (except volatiles). Samples for volatile organics will be grab samples selected from one of the five discrete samples on the basis of HNu results and/or other evidence of contamination. If samples give HNu readings, selection will be based on highest HNu reading. Otherwise samples which appear most contaminated will be selected. A 1-foot grab sample of the natural subsoil will be obtained from each boring using the split-spoon.

Soil borings will be advanced to a depth of two feet, below which a 6-inch split spoon sample will be obtained. The auger will be advanced to a depth of 4 feet and another sample obtained from the interval 4 to 4.5 feet. Each of these 6-inch samples will be a grab sample.

Samples will be placed in the appropriate containers and boreholes will be filled with bentonite grout to the surface. All drilling equipment and tools will be cleaned between sampling locations according to procedures in Section 6.

5.9 LEACHATE WELL INSTALLATION AND SAMPLING

A hollow-stem auger will be used to advance the borehole up to 15 feet below the first saturated zone encountered; in no event shall any liner present be penetrated. The entire saturated zone penetrated shall be screened using threaded flush-joint PVC with PVC riser pipe to the surface. The screen openings shall be 0.01 inch with a No. 30 flint sand (or equivalent) filter. The filter shall extend to 2-feet above the screen, above which a two-foot bentonite pellet seal will be placed. The remaining annular space to within 3-feet of the surface will be filled with bentonite grout. A concrete seal will then be placed to the surface, forming an apron at the surface. Concrete barrier posts shall be placed around the concrete apron.

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The well shall be developed and sampled using a stainless steel bailer. All purge and development water shall be collected and containerized. Sampling will be conducted as for the groundwater wells under 5.1.1 except that a bailer will be used. Trip blanks will be prepared as described in 5.1.1. The field blank will be prepared by pouring deionized water into a clean bailer and filling sample bottles in the same manner as for an investigative sample. The drilling and sampling equipment shall be cleaned and stored between wells using the procedures outlined in Section 6.

5.10 SEDIMENT AND WATER SAMPLING

The surface water grab sample will be collected prior to collecting the sediment (grab) sample at a given location. Where appropriate, the samples will be taken from the most distal downstream location to the furthest upstream location. Samples will be obtained with stainless steel equipment which will be decontaminated between sample locations using the procedures outlined in Section 6. A bucket auger will be used to collect a sample from the depth interval 0 to 6 inches. Samples will be placed into the appropriate containers. Duplicates will be collected for both sediment and water samples, but field blanks will only be prepared for water samples. Water samples will not be filtered. Trip blanks will be prepared as outlined under 5.1.1.

5.11 EFFLUENT SAMPLING

This effort will be designed after the Environmental Audit of ACS.

5.12 PERSONNEL AND RESPONSIBILITIES

All personnel working at the ACS site on the RI will have been trained in health and safety matters relating to hazardous waste site investigations. Efforts will be made to use the same personnel throughout the course of the field work to optimize familiarity with site conditions. The boundary survey will be done by an Indiana licensed land surveyor. All other surveys will be conducted by a two-person team.

A two-person drilling crew and two field technicians will be supervised by a geologist or engineer. The geologist or engineer will also serve as the Safety Officer. A geologist will conduct the slug tests and log the soil samples. Samples will be collected by or under the supervision of the geologist in the various media: groundwater, surface water, leachate and waste. Also water levels will be collected by the geologist or engineer, and a field technician. An earth moving subcontractor will operate the backhoe.

- Chain-of-custody number
- Lab code
- Date sampled
- Date shipped
- Airbill number
- Sampling tag number

Paperwork accompanying the samples being shipped to the laboratory will be sealed in a plastic bag that is taped to the inside of the cooler lid. Copies of the chain-of-custody forms, and other paperwork (if possible), will be retained for the field files.

Two sample seals will be placed on opposite sides of the lid and extending down the sides of the cooler. The lid will be securely taped shut prior to shipment.

Each sample location will be marked, and later each location will be surveyed to the establish location within one foot horizontally and vertically. Locations will be numbered and plotted on a map for the RI Report. Representative photographs will be taken of sampling stations to show surrounding area and used to locate the station. The picture number and roll number will be logged in the field log book to identify which sampling site is depicted in the photograph. The film roll number will be identified by taking a photograph of an informational sign on the first frame of the roll. This sign would have the job and film roll number written on it so as to identify the pictures contained on the roll.

For example:

American Chemical Services
Roll Number 1
Frame Number 1 of 36
1 Nov 1988

All sampling documentation will be maintained in Warzyn files as outlined in the QAPP.

Keplaces 6th pg & App C.

If the sample concentration exceeds five times the detection limit of the instrument or method in use, the value may be reported even though the instrument or method detection limit may not equal the Contract Required Detection Limit. This is illustrated in the example below:

For Lead:

Method in use - ICP
Instrument Detection Limit (IDL) - 40
Sample concentration - 220
Contract Required Detection Limit (CRCL) - 5

(2) The value of 200 may be reported even though instrument detection limits obtained in pure water that may be met during the procedure in Exhibit E of SOW 7/87. The detection limits for samples may be considerably higher depending on the sample matrix.

(3) CRDLs for the CLP RAS TAL metals are not included because detection limits vary with percent moisture. (This is consistent with the EPA CLP SOW for TAL metals).

8

Add to App C

Method Detection Limits

Compound	Low Level Method Detection Limit (μg/L)
Aldrin	0.005
alpha-BHC	0.002
beta-BHC	0.003
gamma-BCH (lindane)	0.005
delta-BHC	0.002
alpha-chlordane	0.003
gamma-chlordane	0.009
Technical chlordane	0.05*
4,4'-DDD	0.005
4,4'-DDE	0.005
4,4'-DDT	0.010
Dieldrin	0.011
Endosulfan I	0.004
Endosulfan II	0.012
Endosulfan sulfate	0.006
Endrin	0.007
Endrin aldehyde	0.012
Endrin ketone	0.005
Heptachlor	0.006
Heptachlor epoxide	0.005
Methoxychlor	0.060
Toxaphene	0.10*
PCB-1016	0.04
PCB-1221	0.05*
PCB-1232	0.05*
PCB-1242	0.05*
PCB-1248	0.05*
PCB-1254	0.05*
PCB-1260	0.03

* Detection limits estimated

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Add to App C

Analytes and Detection L
by GC-MS Method

Parameter	CAS Number	Low Level Detection Limits Water (ug/L)
Chloromethane	74-87-3	.712
Bromomethane	74-83-9	.223
Vinyl Chloride	75-01-4	.423
Chloroethane	75-00-3	.924
Methylene Chloride	75-09-2	.747
Acetone	67-64-1	.697
Carbon Disulfide	75-15-0	.255
1,1-Dichloroethene	75-35-4	.289
1,1-Dichloroethane	75-35-3	.238
t,2-Dichloroethene (total)	156-60-5	.217
Chloroform	67-66-3	.269
1,2-Dichloroethane	107-06-2	.660
2-Butanone[a]	78-93-3	5.0
1,1,1-Trichloroethane	71-55-6	.876
Carbon Tetrachloride	56-23-5	.303
Vinyl Acetate	108-05-4	1.100
Bromodichloromethane	75-27-4	.279
1,1,2,2-Tetrachloroethane	79-34-5	.392
1,2-Dichloropropane	78-87-5	.309
trans-1,3-Dichloropropene	10061-02-6	.240
Trichloroethene	79-01-6	.206
Dibromochloromethane	124-48-1	.268
1,1,2-Trichloroethane	79-00-5	.262
Benzene	71-43-2	.248
cis-1,3-Dichloropropene	10061-01-5	.385
2-Chloroethyl vinyl ether	110-75-8	.355
Bromoform	75-25-2	.684
2-Hexanone	591-78-6	.479
4-Methyl-2-Pentanone	108-10-1	.541
Tetrachloroethene	127-18-4	.336
Toluene	108-88-3	.244
Chlorobenzene	108-90-7	.182
Ethyl benzene	100-41-4	.876
Styrene	100-42-5	.266
Total xylenes		.741

a Based on laboratory experience.

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METHOD DETECTION LIMIT SUMMARY
LOW LEVEL WATER ANALYSIS
SEMIVOLITILE COMPONENT

	UG/L #1	UG/L #2	UG/L #3	UG/L #4	UG/L #5	UG/L #6	UG/L #7	STD. DEV. #1-#7	STD. DEV. *N	SPIKE LEVEL UG/L
C315 PHENOL	3.008	3.316	3.688	2.746	3.354	3.381	3.709	0.346	1.087	10.000
C325 BIS(2-CHLOROETHYL)ETHER	7.780	8.185	8.020	8.543	8.174	7.807	8.074	0.259	0.814	10.000
C330 2-CHLOROPHENOL	5.511	5.949	6.433	5.246	5.993	6.378	6.704	0.521	1.638	10.000
C335 1,3-DICHLOROBENZENE	7.011	7.385	7.180	7.178	6.980	6.892	7.285	0.176	0.554	10.000
C340 1,4-DICHLOROBENZENE	7.108	7.602	7.259	7.170	7.212	6.985	7.335	0.221	0.693	10.000
C345 BENZYL ALCOHOL	6.342	6.689	7.416	6.197	7.228	7.186	7.785	0.584	1.835	10.000
C350 1,2-DICHLOROBENZENE	7.246	7.641	7.563	7.647	7.448	7.034	7.230	0.236	0.742	10.000
C355 2-METHYLPHENOL	5.182	5.462	6.082	5.006	5.773	5.739	5.869	0.387	1.217	10.000
C360 BIS(2-CHLOROISOPROPY)ETHER	9.002	9.210	8.348	10.610	9.690	8.088	7.709	1.002	3.148	10.000
C365 4-METHYLPHENOL	4.797	4.888	5.400	4.321	5.480	5.227	5.175	0.416	1.307	10.000
C370 N-NITROSO-DI-N-PROPYLAMINE	8.934	9.459	8.810	9.550	9.734	8.342	8.247	0.590	1.856	10.000
C375 HEXACHLOROETHANE	6.909	7.297	6.298	7.130	6.796	5.925	6.271	0.505	1.587	10.000
C410 NITROBENZENE	9.846	10.638	6.043	10.575	10.331	10.203	10.956	1.693	5.321	10.000
C415 ISOPHORONE	9.089	9.791	10.436	8.957	9.946	10.134	10.726	0.656	2.060	10.000
C420 2-NITROPHENOL	7.543	7.969	8.570	5.827	7.784	7.860	8.149	0.875	2.749	10.000
C425 2,4-DIMETHYLPHENOL	6.033	6.096	6.942	4.949	5.973	6.600	6.838	0.680	2.136	10.000
C430 BENZOIC ACID	3.464	3.185	0.777	2.715	A	6.988	A	A	A	50.000
C435 BIS(2-CHLOROETHOXY)METHANE	9.230	9.549	9.794	9.226	9.451	9.233	9.589	0.221	0.694	10.000
C440 2,4-DICHLOROPHENOL	6.726	7.238	7.660	5.879	7.098	7.219	7.558	0.602	1.891	10.000
C445 1,2,4-TRICHLOROBENZENE	7.791	8.016	8.036	7.272	7.575	7.569	7.940	0.283	0.891	10.000
C450 NAPHTHALENE	8.783	8.917	8.916	8.959	8.692	8.588	8.775	0.135	0.425	10.000
C455 4-CHLOROANALINE	11.831	12.152	12.512	11.205	12.289	11.640	12.561	0.495	1.555	10.000
C460 HEXACHLOROBUTADIENE	7.545	7.876	8.191	6.811	7.166	7.463	7.592	0.450	1.414	10.000
C465 4-CHLORO-3-METHYLPHENOL	7.128	7.104	7.893	6.626	7.796	7.844	7.688	[illegible]	1.533	10.000
C470 2-METHYLNAPHTHALENE	8.436	8.407	8.719	8.268	8.624	8.273	8.505	0.169	0.530	10.000
C510 HEXACHLOROCYCLOPENTADIENE	3.516	3.079	3.357	2.295	3.035	2.907	3.431	0.416	1.307	10.000
C515 2,4,6-TRICHLOROPHENOL	7.573	7.540	8.251	6.023	7.502	7.706	8.001	0.712	2.239	10.000
C520 2,4,5-TRICHLOROPHENOL	7.496	7.704	8.565	5.657	7.690	7.549	7.665	0.879	2.763	10.000
C525 2-CHLORONAPHTHALENE	8.777	8.782	9.131	8.492	8.481	8.415	8.980	0.278	0.873	10.000
C530 2-NITROANALINE	9.308	9.673	10.123	10.240	10.575	9.960	10.685	0.486	1.526	10.000
C535 DIMETHYLPHTHALATE	7.584	8.156	7.982	7.643	7.442	7.440	7.563	0.276	0.867	10.000
C540 ACENAPHTHYLENE	8.792	9.023	9.165	9.006	8.919	8.902	9.217	0.150	0.470	10.000
C545 3-NITROANALINE	11.823	12.606	12.290	11.759	12.792	12.358	12.914	0.449	1.411	10.000
C550 ACENAPHTHENE	9.331	9.526	9.634	9.389	9.302	9.123	9.284	0.168	0.527	10.000
C555 2,4-DINITROPHENOL	27.916	31.863	24.091	40.919	42.855	33.822	9.526	11.261	35.393	50.000
C560 4-NITROPHENOL	10.817	15.304	15.424	18.363	17.585	15.666	9.441	3.324	10.447	50.000
C565 DIBENZOFURAN	9.224	9.513	9.659	9.561	9.511	9.360	9.271	0.160	0.504	10.000
C570 2,4-DINITROTOLUENE	9.036	9.248	9.318	8.720	9.478	8.826	8.973	0.274	0.861	10.000
C543 2,6-DINITROTOLUENE	9.366	9.258	9.458	8.866	9.304	8.952	9.636	0.272	0.855	10.000
C580 DIETHYLPHTHALATE	9.087	9.739	9.614	9.099	9.304	9.057	9.073	0.284	0.894	10.000
C585 4-CHLOROPHENYL-PHENYLETHER	9.374	9.468	9.875	9.107	9.281	9.189	8.914	0.306	0.962	10.000
C590 FLUORENE	9.280	9.576	9.525	9.326	9.494	9.303	9.165	0.151	0.476	10.000
C595 4-NITROANALINE	9.056	9.288	9.393	8.204	9.709	[illegible]	9.442	0.491	1.544	10.000
C610 4,6-DINITRO-2-METHYLPHENOL	7.019	7.456	7.769	1.778	2.999	3.244	3.059	2.536	7.972	10.000
C615 N-NITROSODIPHENYLAMINE	9.072	8.903	9.145	9.353	8.865	8.642	9.082	0.228	0.717	10.000
C625 4-BROMOPHENYL-PHENYLETHER	9.188	9.167	9.700	9.180	9.044	8.830	8.909	0.282	0.886	10.000
C630 HEXACHLOROBENZENE	9.347	9.701	10.381	9.573	9.652	[illegible]	9.158	0.386	1.213	10.000
C635 PENTACHLOROPHENOL	5.947	6.486	8.134	2.365	4.261	3.477	4.892	1.900	5.970	10.000
C640 PHENANTHRENE	9.866	9.988	9.954	10.034	9.748	9.815	9.832	0.103	0.325	10.000
C645 ANTHRACENE	9.565	9.710	9.787	9.751	9.450	9.370	9.636	0.119	0.376	10.000
C650 DI-N-BUTYLPHTHALATE	13.464	12.669	13.574	12.731	13.156	12.998	14.493	0.627	1.971	10.000
C655 FLUORANTHENE	9.938	10.404	10.247	10.364	9.890	9.917	10.715	0.311	0.976	10.000
C715 PYRENE	9.857	9.804	10.177	9.277	10.461	9.897	9.944	0.363	1.140	10.000
C720 BUTYLBENZYLPHTHALATE	9.327	9.560	10.387	8.887	10.593	10.394	11.408	0.879	2.763	10.000
C725 3,3'-DICHLOROBENZIDINE	8.545	10.044	10.205	9.597	10.418	10.448	11.621	0.932	2.931	10.000
C730 BENZO(A)ANTHRACENE	9.258	9.496	9.332	9.178	9.268	9.232	9.256	0.102	0.321	10.000
C745 BIS(2-ETHYLHEXYL)PHTHALATE	10.234	10.299	10.802	10.167	11.421	10.806	11.631	0.583	1.833	10.000
C740 CHRYSENE	9.573	9.938	9.855	9.767	9.636	9.652	9.611	0.137	0.432	10.000
C760 DI-N-OCTYLPHTHALATE	8.576	9.079	9.692	9.225	9.725	9.390	10.292	0.547	1.719	10.000
C765 BENZO(B)FLUORANTHENE	8.650	8.991	9.266	8.363	8.235	8.671	8.488	0.359	1.129	10.000
C770 BENZO(K)FLUORANTHENE	9.428	9.738	10.608	10.381	9.734	9.190	10.890	0.636	2.000	10.000
C775 BENZO(A)PYRENE	8.674	8.627	8.981	8.695	8.896	8.717	8.664	0.134	0.421	10.000
C780 INDENO(1,2,3-CD)PYRENE	10.719	9.990	11.098	9.477	10.749	9.669	10.256	0.603	1.896	10.000
C785 DIBENZ(A,H)ANTHRACENE	8.697	8.290	9.012	7.969	8.943	8.092	8.333	0.411	1.292	10.000
C790 BENZO(G,H,I)PERYLENE	8.899	8.447	9.311	7.970	8.591	8.109	8.391	0.460	1.445	10.000

A COMPOUND NOT DETECTED IN ALL SAMPLES ANALYZED. STANDARD CLP
DETECTION LIMIT WILL BE UTILIZED

N N=3.143

Add to App C Hazleton low DL

04/21/89

METHOD DETECTION LIMIT SUMMARY
25 mL SAMPLE PURGE GC-MS ANALYSIS
VOLATILES FRACTION

COMPOUND NAME	SPIKE LEVEL (UG/L)	CONCENTRATIONS (UG/L) 904CA211	904CA212	904CA213	904CA214	904CA215	904CA217	904CA218	AVG. CONC. (UG/L)	STD. DEV. (SD) (UG/L)	CALC. DET. LIMIT (3.143 X SD) (UG/L)
CHLOROMETHANE	1.000	1.186	1.297	1.020	1.120	1.094	1.221	1.333	1.182	0.112	0.352
BROMOMETHANE	1.000	1.110	1.359	1.107	1.156	1.163	1.183	1.231	1.188	0.086	0.270
VINYL CHLORIDE	1.000	1.106	1.340	1.094	1.131	1.164	1.248	1.276	1.194	0.094	0.297
CHLOROETHANE	1.000	1.078	1.286	1.107	1.071	1.175	1.127	1.142	1.141	0.073	0.231
METHYLENE CHLORIDE	1.000	2.691	2.321	2.301	2.474	2.337	2.393	2.152	2.381	0.168	0.528
ACETONE	1.000	3.914	3.133	2.035	3.489	3.295	4.691	3.959	3.502	0.829	2.606
CARBON DISULFIDE	1.000	0.885	1.042	0.904	0.960	0.900	1.016	1.002	0.961	0.068	0.213
1,1-DICHLOROETHENE	1.000	1.086	1.316	1.142	1.133	1.226	1.164	1.132	1.171	0.077	0.240
1,1-DICHLOROETHANE	1.000	1.133	1.278	1.124	1.112	1.226	1.174	1.208	1.182	0.059	0.186
1,2-DICHLOROETHENE (TOTAL)	1.000	1.052	1.206	1.077	1.088	1.182	1.112	1.118	1.119	0.056	0.176
CHLOROFORM	1.000	1.169	1.273	1.137	1.120	1.195	1.191	1.194	1.183	0.050	0.156
1,2-DICHLOROETHANE	1.000	1.199	1.266	1.177	1.132	1.215	1.203	1.263	1.208	0.047	0.148
2-BUTANONE	ND	ND	ND	ND	ND	ND	ND	ND	—	—	*
1,1,1-TRICHLOROETHANE	1.000	1.120	1.209	1.068	1.126	1.151	1.135	1.146	1.136	0.042	0.132
CARBON TETRACHLORIDE	1.000	0.942	1.044	0.937	0.993	0.999	0.982	1.071	0.995	0.049	0.155
VINYL ACETATE	1.000	0.985	1.035	0.905	1.041	0.956	1.023	1.113	1.008	0.067	0.210
BROMODICHLOROMETHANE	1.000	0.938	0.991	0.903	0.934	0.937	0.937	0.974	0.948	0.029	0.092
1,2-DICHLOROPROPANE	1.000	1.117	1.127	1.006	1.095	1.088	1.110	1.088	1.090	0.040	0.126
CIS-1,3-DICHLOROPROPENE	1.200	1.346	1.321	1.162	1.203	1.321	1.335	1.270	1.280	0.071	0.224
TRICHLOROETHENE	1.000	1.084	1.200	1.027	1.043	1.129	1.138	1.109	1.104	0.059	0.186
DIBROMOCHLOROMETHANE	1.000	0.843	0.844	0.742	0.772	0.808	0.818	0.777	0.801	0.038	0.121
1,1,2-TRICHLOROETHANE	1.000	1.071	1.042	0.941	0.988	1.138	1.036	0.944	1.023	0.071	0.223
BENZENE	1.000	1.105	1.229	1.031	1.135	1.178	1.157	1.174	1.144	0.063	0.198
TRANS-1,3-DICHLOROPROPENE	0.800	0.788	0.801	0.685	0.775	0.814	0.768	0.724	0.765	0.045	0.143
2-CHLOROETHYL VINYL ETHER	1.000	0.910	0.961	0.879	0.778	0.906	0.874	0.873	0.880	0.056	0.173
BROMOFORM	1.000	0.696	0.682	0.593	0.637	0.644	0.650	0.625	0.647	0.033	0.108
4-METHYL-2-PENTANONE	1.000	1.113	1.218	1.073	1.296	1.098	1.268	1.150	1.174	0.087	0.275
2-HEXANONE	1.000	1.395	1.095	1.282	1.044	0.914	1.187	1.200	1.160	0.158	0.498
TETRACHLOROETHENE	1.000	1.247	1.259	1.191	1.094	1.245	1.240	1.189	1.209	0.058	0.182
1,1,2,2-TETRACHLOROETHANE	1.000	1.080	1.105	1.011	0.919	1.123	0.986	1.021	1.035	0.072	0.227
TOLUENE	1.000	1.277	1.341	1.260	1.172	1.330	1.269	1.240	1.270	0.057	0.178
CHLOROBENZENE	1.000	1.126	1.109	1.072	1.079	1.172	1.131	1.131	1.128	0.042	0.132
ETHYLBENZENE	1.000	1.102	1.197	1.127	1.076	1.111	1.221	1.114	1.135	0.053	0.167
STYRENE	1.000	1.128	1.164	0.940	1.095	1.039	1.165	1.092	1.089	0.079	0.249
TOTAL XYLENES	1.000	1.110	1.249	1.042	1.145	1.052	1.252	1.122	1.139	0.085	0.266
ACROLEIN	5.000	4.324	2.723	4.288	2.869	3.669	3.851	3.412	3.577	0.330	1.037
ACRYLONITRILE	5.000	4.121	4.556	4.157	3.377	4.439	4.722	4.692	4.295	0.469	1.474

ND = THIS COMPOUND NOT DETECTED AT A 1.000 UG/L SPIKE CONCENTRATION.

* = DETECTION LIMIT FOR THIS COMPOUND SET TO 5.000 UG/L
BASED ON LABORATORY EXPERIENCE.

04/21/89

METHOD DETECTION LIMIT SUMMARY
25 mL SAMPLE PURGE GC-MS ANALYSIS
VOLATILES FRACTION
REPORTED DETECTION LIMITS

COMPOUND NAME	CALC. DET. LIMIT (3.143 X SD) (UG/L)	Lowest concentration at which spectral identification was achieved. Used in the determination of the the Reported Detection Limits. 0.2 UG/L SPIKE 904CA224	0.5 UG/L SPIKE 904CA223	1.0 UG/L SPIKE 904CA217	5.0 UG/L SPIKE 904CA201	REPORTED DET. LIMIT (UG/L)	COMPOUND NAME
HLOROMETHANE	0.352	0.199				0.352	CHLOROMETHANE
ROMOMETHANE	0.270	0.223				0.270	BROMOMETHANE
INYL CHLORIDE	0.297	0.201				0.297	VINYL CHLORIDE
HLOROETHANE	0.231	0.205				0.231	CHLOROETHANE
ETHYLENE CHLORIDE	0.528	1.669				1.669	METHYLENE CHLORIDE
CETONE	2.606		2.737			2.737	ACETONE
ARBON DISULFIDE	0.213	0.246				0.246	CARBON DISULFIDE
.1-DICHLOROETHENE	0.240	0.234				0.240	1,1-DICHLOROETHENE
.1-DICHLOROETHANE	0.186	0.232				0.232	1,1-DICHLOROETHANE
.2-DICHLOROETHENE (TOTAL)	0.176	0.195				0.195	1,2-DICHLOROETHENE (TOTAL)
HLOROFORM	0.136	0.229				0.229	CHLOROFORM
.2-DICHLOROETHANE	0.148		0.552			0.552	1,2-DICHLOROETHANE
-BUTANONE	*				5.000	5.000	2-BUTANONE
.1,1-TRICHLOROETHANE	0.132	0.226				0.226	1,1,1-TRICHLOROETHANE
ARBON TETRACHLORIDE	0.135	0.171				0.171	CARBON TETRACHLORIDE
INYL ACETATE	0.210	0.254				0.254	VINYL ACETATE
ROMODICHLOROMETHANE	0.092	0.187				0.187	BROMODICHLOROMETHANE
.2-DICHLOROPROPANE	0.126	0.213				0.213	1,2-DICHLOROPROPANE
IS-1,3-DICHLOROPROPENE	0.224	0.373				0.373	CIS-1,3-DICHLOROPROPENE
RICHLOROETHENE	0.186	0.214				0.214	TRICHLOROETHENE
IBROMOCHLOROMETHANE	0.121	0.150				0.150	DIBROMOCHLOROMETHANE
.1,2-TRICHLOROETHANE	0.223	0.141				0.223	1,1,2-TRICHLOROETHANE
ENZENE	0.198	0.248				0.248	BENZENE
RANS-1,3-DICHLOROPROPENE	0.143		0.313			0.313	TRANS-1,3-DICHLOROPROPENE
-CHLOROETHYL VINYL ETHER	0.175			0.874		0.874	2-CHLOROETHYL VINYL ETHER
ROMOFORM	0.108			0.650		0.650	BROMOFORM
-METHYL-2-PENTANONE	0.275			1.268		1.268	4-METHYL-2-PENTANONE
-HEXANONE	0.498			1.187		1.187	2-HEXANONE
ETRACHLOROETHENE	0.182	0.224				0.224	TETRACHLOROETHENE
.1,2,2-TETRACHLOROETHANE	0.227	0.225				0.227	1,1,2,2-TETRACHLOROETHANE
OLUENE	0.178	0.281				0.281	TOLUENE
HLOROBENZENE	0.132	0.228				0.228	CHLOROBENZENE
THYLBENZENE	0.147	0.205				0.205	ETHYLBENZENE
TYRENE	0.249	0.287				0.287	STYRENE
TOTAL XYLENES	0.264	0.276				0.276	TOTAL XYLENES
ACROLEIN	1.037			3.851		3.851	ACROLEIN
ACRYLONITRILE	1.474			4.722		4.722	ACRYLONITRILE

ND = THIS COMPOUND NOT DETECTED AT A 1.000 UG/L SPIKE CONCENTRATION

* = DETECTION LIMIT FOR THIS COMPOUND SET TO 5.000 UG/L
BASED ON LABORATORY EXPERIENCE

METHOD DETECTION LIMIT SUMMARY
LOW LEVEL WATERS
PESTICIDE / PCBs

SPIKED COMPOUND	SPIKE LEVEL (UG/L)	UG/L #1	UG/L #2	UG/L #3	UG/L #4	UG/L #5	UG/L #6	UG/L #7	STANDARD DEVIATION	METHOD DECTECT. LIMIT	TARGET DETECT. LIMITS*	AVERAGE PERCENT RECOVERY
A-BHC	0.0125	0.011	0.011	0.012	0.012	0.011	0.011	0.011	0.0005	0.002	0.005	90
B-BHC	0.0125	0.010	0.010	0.011	0.011	0.011	0.010	0.010	0.0005	0.002	0.005	84
D-BHC	0.0125	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.0004	0.001	0.005	95
G-BHC	0.0125	0.010	0.009	0.010	0.011	0.010	0.010	0.011	0.0007	0.002	0.005	80
HEPTACHLOR	0.0125	0.009	0.009	0.010	0.009	0.009	0.009	0.009	0.0004	0.001	0.005	74
ALDRIN	0.0125	0.012	0.013	0.013	0.012	0.013	0.013	0.012	0.0005	0.002	0.005	100
HEPT EPOX	0.0125	0.010	0.010	0.012	0.011	0.010	0.010	0.010	0.0008	0.003	0.005	82
ENDO-1	0.0125	0.012	0.013	0.012	0.011	0.010	0.010	0.012	0.0011	0.003	0.005	91
DIELDRIN	0.0250	0.022	0.021	0.023	0.022	0.022	0.022	0.017	0.0020	0.006	0.01	85
4,4-DDE	0.0250	0.022	0.022	0.024	0.030	0.032	0.027	0.023	0.0040	0.013	0.01	98
NDRIN	0.0250	0.028	0.029	0.032	0.029	0.029	0.034	0.029	0.0022	0.007	0.01	119
ENDO-2	0.0250	0.018	0.016	0.019	0.019	0.017	0.018	0.019	0.0012	0.004	0.01	72
4,4-DDD	0.0250	0.023	0.024	0.025	0.025	0.024	0.024	0.023	0.0008	0.003	0.01	96
NDO-SULF	0.0250	0.022	0.027	0.023	0.022	0.010	0.021	0.021	0.0052	0.016	0.01	83
4,4-DDT	0.0250	0.038	0.039	0.040	0.039	0.037	0.038	0.040	0.0011	0.003	0.01	154
METHOXYCHL	0.1250	0.107	0.119	0.125	0.137	0.124	0.118	0.104	0.0110	0.03	0.050	95
ENDRIN KET	0.0250	0.019	0.013	0.012	0.012	0.021	0.013	0.019	0.0039	0.01	0.01	61
A-CHLDR	0.0125	0.013	0.014	0.014	0.013	0.012	0.012	0.016	0.0014	0.004	0.005	108
G-CHLDR	0.0125	0.011	0.009	0.010	0.011	0.011	0.010	0.011	0.0008	0.003	0.005	85
TOXAPHENE	0.20	0.19	0.18	0.18	0.17	0.16	0.20	0.18	0.01	0.03	0.1	89
AR-1016	0.0500	0.034	0.042	0.038	0.037	0.037	0.039	0.041	0.0027	0.01	0.05	76
AR-1221	0.10	0.10	0.11	0.14	0.16	0.12	0.19	0.10	0.03	0.09	0.05	132
AR-1232	0.0500	0.068	0.060	0.062	0.050	0.060	0.055	0.059	0.0056	0.02	0.05	118
AR-1242	0.0500	0.055	0.041	0.046	0.050	0.057	0.046	0.059	0.0066	0.02	0.05	101
AR-1248	0.0500	0.069	0.071	0.064	0.063	0.066	0.056	0.067	0.0049	0.01	0.05	130
AR-1254	0.10	0.084	0.11	0.11	0.10	0.11	0.090	0.087	0.01	0.03	0.1	99
AR-1260	0.0500	0.051	0.055	0.050	0.050	0.055	0.057	0.052	0.0028	0.01	0.1	106

* TARGET DETECTION LIMITS FOR ALPHA- AND GAMMA-CHLORDANE ARE SHOWN AS ONE ONE-HUNDRETH THE NORMAL DETECTION LIMIT. THE NORMAL DETECTION LIMITS ARE BELIEVED TO BE ARTIFICIALLY HIGH BY TEN TIMES.

TELECOPIER COVER SHEET

Warzyn Engineering Inc.

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Date: 5/30/89

To: Robert Swale FAX # 886-4071
US EPA

From: Peter Vogt

Sending a total of 25 pages, excluding this cover page. If you do not receive all pages, or are experiencing other problems in transmission, please call (312)773-8484. Thank you.

Re: Bob I've numbered the comments on your letter, and then included our corrections with the same numbers for cross reference

Project Number: G0251

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